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**ARMCOM RED TEAM ROLE IN
THE SINGLE INTEGRATED
DEVELOPMENT TEST CYCLE**

THOMAS N. MAZZA

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NOVEMBER 1975

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**US ARMY ARMAMENT COMMAND
SYSTEMS ANALYSIS DIRECTORATE
ROCK ISLAND, ILLINOIS 61201**

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) As part of the new Single Integrated Development Test Cycle Policy, TECOM in coordination with each MSC's Red Team is responsible for evaluation of Development Testing for all systems that AMSAA does not evaluate. This report defines the scope and manpower requirements of the ARMCOM Systems Analysis Directorate in support of the Test Design and Evaluation effort. Twenty-five dedicated professional personnel are required in the Systems Analysis Directorate for the Test Design and Evaluation on a full time basis. These personnel exclude those now serving to fulfill the existing mission requirements of the Directorate.			

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OBJECTIVE

This document defines the scope of, and manpower requirements for, the Test Design and Evaluation effort to be performed by the Systems Analysis Directorate of the US Army Armament Command (ARMCOM) for implementation of the Single Integrated Development Test Policy in coordination with the US Army Test and Evaluation Command (TECOM).

INTRODUCTION

One of the recommendations of the Army Materiel Acquisition Review Committee (AMARC) was to eliminate redundancy in the development testing process and to integrate independent tests that were, heretofore, poorly coordinated. To implement these recommendations, the Army Materiel Command (AMC) has issued a new policy (Appendix A) initiating a Single Integrated Development Test Cycle (SIDTC). This policy directs the following actions:

1. Development testing shall be structured as an integrated test cycle to assure that the contractor, developer, evaluator, and tester work together to maximize the use of test data and thereby minimize test cost.
2. A group separate from both the developer and the tester shall perform an independent evaluation of test results to insure objectivity in the analysis.

Subsequent AMC guidance directed that the responsible developer establish a Test Integrated Working Group (TIWG) for each "major" and "designated non-major" development effort to effect the necessary coordination. For all other systems or family of systems, a TIWG may be assembled for the purpose of guiding the testing aspects of each program in an efficient cost-effective manner. The establishment of TIWGs for non-major systems will be at the discretion of a joint Materiel Developer/TRADOC working group. One of the significant products of the TIWG effort will be a set of test plans for data acquisition. Those test plans will insure that adequate data are acquired to permit complete characterization of system performance.

As part of this analysis, the Army Materiel Systems Analysis Agency (AMSAA) has been designated as the independent evaluator for major and designated non-major or special items. For all other systems, TECOM, in coordination with the Major Subordinate Command (MSC) "Red Team", is given the independent evaluator responsibility. The decisions reached by the TIWG are derived in part from the Red Team evaluation and other Red Team/Blue Team analyses.

Within ARMCOM, the Research, Development and Engineering Directorate (AMSAR-RD) has been assigned responsibility to implement the new SIDTC

Policy, and the Systems Analysis Directorate (AMSAR-SA) has been assigned responsibility for the Red Team function¹. The Red Team will work together with the Blue Team during certain phases of the test cycle and independently of the Blue Team during other phases.

The Red/Blue Team concept has been used for several years. The Blue Team is the organization responsible for a given course of action (in this case, the developer). The Red Team is a small group of analysts or specialists who provide an independent evaluation of the course of action recommended or taken by the Blue Team. The AMC concept expands the Red Team activities further to include actual participation in the test design. This paper develops (1) the responsibilities and relationships of the Red Team in the SIDTC in coordination with TECOM and (2) the workload expected.

FUNCTIONS OF THE RED TEAM

The Red Team will be actively involved throughout the development test cycle for all non-major items which are its responsibility. This will include the review of letters of agreement and requirements documents, participation in test design, monitoring of test, evaluation of test results, and presentation of the independent overall evaluation. The TECOM task team will integrate the TECOM efforts for planning, conducting, and analyzing the test and will also coordinate the Red Team participation. The Red Team will participate in all TIWGs for non-major items. Specific analyses will be delegated to the Red Team, particularly in the area of cost-effectiveness, risk analysis, and other systems analysis for which the Red Team has responsibility/capability.

The Red Team functions keyed to phases of the life cycle are described in Appendix B. The initial major task of the Red Team will be the preparation of the Independent Evaluation Plan (IEP) which is included in the developer's Coordinated Test Plan (CTP). The IEP and the subsequent Independent Overall Evaluation (IOE) will be joint efforts of the Red Team and TECOM with the latter being primarily conducted by the Red Team.

Independent Evaluation Plans.

IEPs are the master plans detailing action for evaluation of the system's technical and operational effectiveness. The IEP includes issues for testing, identification of data sources, test descriptions, and the approach to evaluation and reporting. The IEP provides the basis for formulating the overall test design. The IEP has eight major sections. The title of each section and the ratio of the ARMCOM Red Team to TECOM workload/responsibility for each section are as follows:

¹Memorandum of Understanding, AMSAR-SA, subject: Red Team Function in the Single Integrated Development Test Cycle, dated 18 August 1975.

<u>Section</u>	<u>Red Team/TECOM</u>
1. Introduction	50/50
2. Objective of Evaluation	75/25
3. Critical Issues	75/25
4. Other Issues	90/10
5. Alternatives	80/20
6. Evaluation Criteria	40/60
7. Evaluation Methodology	75/25
8. Constraints	75/25

Appendix C describes the basic outline and contents of each section.

Independent Overall Evaluation.

The Independent Overall Evaluation will be conducted in accordance with Section 7 of the IEP. System performance will be assessed against established, coordinated, and TRADOC-approved scenarios where applicable. Cost/Benefit Analysis will be made to determine the desirability of correcting deficiencies and shortcomings and/or continued development. Logistic and training implications will be addressed and their impact on life-cycle cost indicated. For life-cycle phase where evaluations are required, the analysis will include:

1. Cost effectiveness
2. Survivability
3. Reliability, Availability, Maintainability (RAM)
4. Risk (cost, schedule, technical)
5. Operational readiness (Logistics)
6. Producibility
7. Contractor constraints/Alternatives
8. Interaction with related systems
9. Life cycle considerations
10. Phasing out old - introducing new

WORKLOAD FORECAST

At present, eighteen systems under ARMCOM are designated for independent evaluation by AMSAA. They are:

<u>System</u>	<u>Designation</u>
1. XM198-155mm, Medium, Towed Howitzer	Major
2. XM712-155mm Cannon-Launched Guided Projectile	Major
3. SAWS-(Squad Automatic Weapon System)	Non-major
4. MICV FPW-MICV Firing Port Weapon	Non-major
5. XM58-Rapidly Emplaced Minefield Marking System (REMMS)	Non-major
6. XM128-Ground Vehicle Dispersed Mine System	Non-major
7. XM204-105mm Soft Recoil, Light, Towed Howitzer	Non-major

8.	XM224 60mm Lightweight Company Mortar System	Non-major
9.	XM587E2 ETSQ Fuze	Non-major
10.	XM650 8-Inch HE, RA, Projectile	Non-major
11.	XM692E1 155mm AP Projectile	Non-major
12.	XM711 8-Inch Extended Range HE Projectile	Non-major
13.	XM718 155mm Antitank Projectile	Non-major
14.	XM753 8-Inch Improved Nuclear Projectile	Non-major
15.	M56-Mine Dispersing Subsystem (PIP)	Non-major
16.	M60A1E3 105mm Tank, F.T. (M116, M140, M150 Gunmounts)	Non-major
17.	M60A2 152mm Tank Gun/Launcher Mount	Non-major
18.	M110E2 Improved 8-Inch SP Howitzer	Non-major

The Systems Analysis Directorate will function as part of the Blue Team in support of the developer for the above items.

Thirty-three non-major ARMCOM systems have been submitted by the subordinate arsenals for the establishment of TIWGs. These systems will come under the Red Team responsibility. The list of these systems for each arsenal follows:

Edgewood

1. Projectile, 155mm, Lethal Binary, GB2, XM687
2. Projectile, 8-Inch, Binary, VX2, XM736
3. Document Destroyer Emergency, Incendiary XM4
4. Rocket, 66mm, TACTICAL, CS, XM96
5. Projectile, 64mm: Riot Control, Kinetic Energy, XM743
6. Projectile, 64mm: Riot Control, CS2, XM742
7. Armored Vehicle Protective Smoke Screen
8. Detector Kit, Chemical Agent: XM256
9. Paper, Chemical Agent Detector: XM9
10. Modular Collective Protective Equipment
11. Mask, Chemical-Biological: Multipurpose, XM29/XM30
12. Alarm, Bio Agt, Auto: Chemiluminescence XM19
13. Alarm, Chemical Agent Automatic: Passive Lopair XM21
14. Projectile, 105mm Screening Smoke, WP XM761
15. Rocket, Smoke, 2.75-Inch Screening, WP, XM129
16. Projectile, 155mm: Smoke, HC, M116E2 (PIP)
17. Decontamination Apparatus, M12A1 (PIP)
18. Cartridge, Smoke, AX: 105mm M84A1 (PIP)

Picatinny

1. Cartridge, 105mm, XM710
2. Cartridge, 40mm, Training, XM-
3. Cartridges, 40mm, Signal
4. Target Marking System (XM182 Flare)
5. Projectile, 155mm, HE, XM708
6. Cartridge, 105mm, HEAT-T, XM622

7. Cartridge, 105mm, APERS-T, XM665
8. Mortar Time Fuze
9. Artillery Remotely Settable Fuze
10. Firing Device, Demolition, XM122
11. Ordnance Locator
12. Projectile, 155mm, M483A1
13. Stick Propellant

Rock Island Arsenal

1. RDGAD (Radar Directed Gun Air Defense System)
2. GLAADS (Gun Low Altitude Air Defense System)

ARMCOM has an additional 30-40 systems under development (XM-designation) and over 150 fielded items which could be added to the list in the future.

TOTAL RED TEAM/BLUE TEAM RESOURCE REQUIREMENTS

It is estimated that 38 man-months of effort will be expended for each non-major system by the Red Team. This effort will be spread over an average development time of 6 years and is broken out into each development phase as follows:

1. Conceptual phase	8.00 man-months
2. Advanced development	13.50 man-months
3. Engineering development	12.25 man-months
4. LRIP	<u>4.25 man-months</u>
TOTAL	38.00 man-months

The major activities of each phase and breakout of the estimated man-months of effort is shown in Appendix B. Based on an average of 35 non-major systems under the Red Team responsibility and 38 man-months of effort for each system over a six year period, the annual Red Team effort will require 18.75 man-years of effort.

$$(35 \text{ systems} \times 38 \text{ man-months} \div 6 \text{ years} \div 12 \text{ man-months/man-year} = 18.47 \text{ man-yrs/yr})$$

Assuming that the Red Team-to-TECOM workload ratio will be approximately 75/25, TECOM will require $(18.47 \div 3)$ 6.15 man-years of effort to perform the TECOM mission responsibilities for ARMCOM systems. This totals to a combined 24.6 man-years of effort per year for an average of 35 non-major systems or .70 man-years per system per year. This is compared to AMSAA's (132 man-years/58 systems) 2.28 man-years of effort forecasted for each major system per year.

In addition to the Red Team function, the Systems Analysis Directorate will also function in the Blue Team role to support the developer on major systems and designated non-major systems. There are presently 18 ARMCOM systems in this category. The Systems Analysis Red/Blue Team functions in support of the developer include:

1. Establishing requirements for a materiel performance technical data base for use in the overall test and evaluation process and validating technical information and data used in the evaluation process.

2. Performing parametric analyses and trade-off studies to support test design, test planning, and test assessment efforts.

3. Preparing risk analysis and risk statements based on analysis of test data.

4. Developing mathematical and simulation models which will permit the study of the ARMCOM view of the system under a very broad range of potential environmental and field scenario conditions.

5. Developing system cost and effectiveness analysis methods and techniques for application to estimating total system cost.

6. Performing and evaluating cost and system effectiveness studies as required by higher headquarters or by internal operations of ARMCOM.

7. Comparing and evaluating alternative test designs and test plans in order to achieve maximum effectiveness at the most economical costs.

These Blue Team functions of the Systems Analysis Directorate (Red Team) on major and designated non-major systems will require approximately the same resources per system as the non-major systems under the Red Team. Based on an average of 15 major/designated non-major systems being supported by the Blue Team, this will require an additional 8 man-years of effort. (15 systems X 38 man-months ÷ 6 years ÷ 12 man-months/man-year = 7.9 man-years/year).

SYSTEMS ANALYSIS DIRECTORATE RESOURCE REQUIREMENTS

The ARMCOM manpower requirements analysis assumes that for the Red Team function the workload breakdown will be similar to AMSAA's and, furthermore, will require effort from other directorates within ARMCOM.

The AMSAA manpower requirements analysis for major, designated and selected non-major systems indicated a workload breakdown covering ten subfunctions². These subfunctions are shown below with the percentage of manpower requirements allocated to each subfunction:

<u>TD&E Subfunction</u>	<u>Manpower (%)</u>
1. Test Design	7.8
2. Monitor Concurrent Analysis	8.6
3. Data Analysis	10.5
4. Evaluation	13.6
5. Administrative	2.3
6. RAM Analyses	12.7

²ECOM Red Team Role in the Single Integrated Development Test Cycle.
Systems Analysis Office, US Army Electronics Manual, Ft. Monmouth, NJ.

<u>TD&E Subfunction</u>	<u>Manpower (%)</u>
7. Logistic Analysis	10.6
8. Economic Analysis	3.9
9. Survivability Analysis	3.0
10. Systems Analysis	27.0
TOTAL	100.0

For subfunction #6, it is assumed that RAM Analyses will require equal amounts of effort from the Systems Analysis Directorate and the Product Assurance Directorate. For subfunction #7, it is expected that 90% of the Logistics Analysis effort will stem from the Systems Analysis Directorate while 10% will be provided by the Maintenance Directorate. For subfunction #8, the Economic Analysis workload will be shared equally between the Systems Analysis Directorate and the Cost Analysis Division of the Comptroller. The support of these other ARMCOM activities will be in addition to their other responsibilities (Blue Team) realted to the TD&E function.

The impact of this requirement on the ARMCOM elements is as follows:

Red Team Function effort: 18.47 man-years/year

Product Assurance (subfunction #6):

$$0.5 \times .127 \times 18.47 = 1.17$$

Maintenance Engineering (subfunction #7):

$$0.1 \times .106 \times 18.47 = .20$$

Cost Analysis - Comptroller (subfunction #8):

$$0.5 \times 0.039 \times 18.47 = .36$$

Systems Analysis Directorate:

$$18.47 - (1.17 + .20 + .36) = 16.74 \text{ man-years}$$

Blue Team Function effort = 7.9 man-years

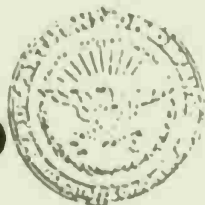
Total requirement for Systems Analysis Directorate = 24.64 man-years/year

The conclusion drawn is that 25 man-years of dedicated professional personnel are required in the Systems Analysis Directorate for Test Design and Evaluation on a full time basis. These personnel exclude those now serving to fulfill the existing mission requirement of the directorate. Two to three professionals from other ARMCOM activities are required to support the total Red Team TD&E requirement.

APPENDIX A

SINGLE INTEGRATED DEVELOPMENT TEST CYCLE IMPLEMENTATION LETTER

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DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY MATERIEL COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA. 22333

AMCRD-U

21 JAN 1975

SUBJECT: Single Integrated Development Test Cycle Policy

SEE DISTRIBUTION

1. References:

a. AR 1000-1, Basic Policies for Systems Acquisition by the Department of the Army, 5 November 1974.

b. AMCQA letter, subject: Development Test Policy, 26 November 1974.

2. Reference 1a establishes the policy that the contractor and AMC developmental testing should be integrated into one cycle. The AMC plan of action for implementing this policy has been approved by CG, AMC. Pending publication of appropriate AMC regulations, interim guidance for implementation is contained in Inclosures 1 through 4. Reference 1b is hereby rescinded. The integrated test cycle plan of action incorporates the test policy contained therein. Inclosure 2 to reference 1b (RDAT study) may be retained for information.

3. Implementation of the Single Integrated Development Test Cycle policy will be accomplished as follows:

a. All new programs will implement the plan of action at program inception.

b. Within current funding and scheduling constraints, all current contracts and on-going programs will be restructured with the objective of implementing the new integrated test concept to the maximum extent possible. Developers will provide AMSAA and TECOM appropriate contractor test data that are available within current contracts. TECOM, in coordination with AMSAA, will, to the extent possible, reduce the scope of currently planned DT II and DT III by making maximum utilization of the contractor test data.

21 JAN 1975

AMCRD-U

SUBJECT: Single Integrated Development Test Cycle Policy

c. AMSAA phase-in plan (Inclosure 3) for accomplishing test design and/or evaluation is provided for planning purposes. AMSAA's functions and responsibilities take effect immediately for all major, designated non-major and other selected systems. Phase-in is dependent on allocation and accomplished on a case-by-case basis. Some systems are currently undergoing tests, thus precluding test design for the on-going phase of the development cycle. Developers should coordinate with AMSAA to arrange for a logical and appropriate phase-in point. However, AMSAA and developers should make every effort to phase-in all systems as soon as possible. For those systems that AMSAA does not evaluate, phase-in of TECOM and the MSC "Red Team" in the role of test designers and evaluators, will be developed by TECOM in coordination with the MSCs. Developers should coordinate with TECOM to arrange for a logical and appropriate phase-in point.

d. Phase-in for current on-going programs should be accomplished, at the latest, at the next major decision point (IPR/ASARC/DSARC) for implementation in the follow-on Development phase (AD, ED, LRIP) or when a program is restructured as a result of program reorientation or change in requirement.

e. Developers will initiate immediate action to establish Test Integration Working Groups (TIWG) for all systems currently under development (Incl 1). Identification of organizational elements of commands/activities participating in the TIWG will be provided to this headquarters, ATTN: AMCRD-U, as soon as possible but not later than the initial scheduled status report date listed in 3f below.

f. Progress on implementation will be reported as follows:

(1) Beginning 1 March 1975, project managers presenting RECAPS to this headquarters will include a status report as part of their RECAPS.

(2) Beginning 1 April 1975, major subordinate commands will include a status report as part of the RD&E Quarterly Review and Analysis.

(3) Beginning March 1975, TECOM will include a status report covering reduction in currently planned DT II and DT III in the TECOM bimonthly Test Problem Briefings to the CG, AMC.

(4) Beginning March 1975, AMSAA will include a status report covering their test design and evaluation mission in the AMSAA monthly Key Efforts Report to HQ AMC.

21 JAN 1975

AMCRD-U

SUBJECT: Single Integrated Development Test Cycle Policy

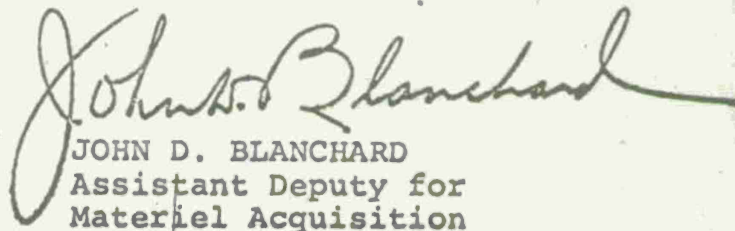
4. It is recognized that the AMC plan of action does not adequately address the interface with the operational tester. By separate correspondence this headquarters will recommend to DA that AMC, TRADOC and OTEA form a working group to expand the AMC plan of action and restructure the Coordinated Test Program.

5. The objective of this policy is to maximize the use of contractor tests thereby reducing testing required by AMC; reduce costs and preclude duplicate testing. Commanders and project managers are requested to make maximum dissemination of the inclosed policies.

FOR THE COMMANDER:

4 Incls

1. DT Policy
2. Responsibilities of AMC elements
3. AMSAA Phase-In Plan
4. A DT Test Cycle Scenario


JOHN D. BLANCHARD
Assistant Deputy for
Materiel Acquisition

DISTRIBUTION:

A & B

SINGLE INTEGRATED DEVELOPMENT TEST POLICY

1. Development testing shall be structured as an integrated test cycle to assure that the contractor, developer, AMSAA and TECOM interact to minimize test cost and maximize the use of test data. DT I, DT II and DT III tests include those tests performed by the contractor, AMC major subordinate commands, project managers and TECOM that are utilized for the overall system evaluation. The Government portion of development testing, keyed to each materiel acquisition phase, will be so structured as to utilize validated contractor generated data to avoid duplicate testing. Inherent to this policy is that successful development decision making lies in independent evaluation of valid data rather than the independent conduct of tests.
2. The integrated development test policy demands a close and continuous interface between the developer, AMSAA, TECOM and the contractor. Close coordination with the operational tester must also be effected to minimize time and cost and to preclude duplication between development testing and operational testing. To facilitate the integration of test requirements and to speed the coordination process, the developer will establish and chair a Test Integration Working Group (TIWG). This group will be formally chartered and consist of members having authority to act for their respective commands/activities. Membership should include representatives of the Combat Developer, Logistician, Operational Tester, AMSAA, TECOM and where appropriate, the contractor. The primary purpose of the TIWG is to:
 - a. Assist the developer in the preparation of Coordinated Test Program (CTP).
 - b. Monitor the test program progress.
 - c. Update the CTP as required.
3. The Coordinated Test Program (CTP) will be utilized as the key management tool for control of the single integrated Contractor/Developer/Tester development test cycle.
4. Test design, planning, programming, budgeting and execution must be a coordinated activity among the contractor, materiel developer, tester (TECOM) and evaluator to provide for a single, well integrated, development test cycle to minimize costs, maximize utilization of test data and standardize definitions and criteria.
5. Test designers, through early planning, must coordinate test design efforts with the objective of requiring a minimum number of tests and test items to obtain the necessary data for evaluations. Number of prototypes, sample size, hours of testing and other test design criteria will be established on the basis of analyses of cost, time and risks in relation to the decision process.

6. Models, simulators, statistical design of experiments, systems analysis, engineering analysis, operations analysis, and data bases in lieu of, or to supplement tests will be used to strengthen evaluation and reduce test costs.

7. Contracts will be structured to assure that development hardware is not submitted for Government testing until the contractor has demonstrated that contract requirements have essentially been met and the developer has a high level of confidence that Government testing will be successfully concluded. The objective is to obviate the conduct of costly and time consuming Government testing of prematurely developed hardware that has little chance for success.

8. Requests for Proposals (RFPs) will include the test requirements to which the system will be tested during DT. Executed contracts will include the tests to be conducted by the contractor, by the Government or jointly by contractor and Government.

9. Insofar as possible, contracts will require that testing to demonstrate compliance with contract hardware requirements be conducted by the contractor. It is recognized that for conduct of certain tests, particularly those involving environmental and terrain conditions, contractors may not have the required facilities. For these tests (within the command policy of maximizing the utilization of TECOM facilities as expressed in 19 Apr 73 AMCDMA letter, subject: Test and Evaluation Role of USATECOM) the following alternatives apply:

a. Where practicable, developers will arrange with TECOM to offer TECOM facilities to the contractor for conducting the tests using contractor personnel. When contractor conducted testing utilizing TECOM facilities is not feasible, these tests will be conducted by TECOM after developer/TECOM coordination. TECOM will develop viable procedures to maximize the use of TECOM facilities by AMC development contractors.

b. Where practicable and where developer test facilities are already available, arrangements for the contractor to conduct his tests using these facilities will be arranged in accordance with the policy expressed in 9a above.

10. When the DD Form 250 is used to move development hardware from the contractor's facility for Government testing, it shall be appropriately annotated to show that the materiel is to be used for test purposes only, and not to denote acceptance of hardware as meeting contract requirements. Hardware acceptance will be made only when the contracting officer has determined that contract compliance has been achieved.

11. Prior to proposal solicitation, each developer will conduct a formal review for traceability of requirements from the system specification/work statement back to the approved LOA, ROC or LR. The purpose is to obtain an objective review and consensus that LOA, ROC or LR requirements have been translated to technical requirements and that, if met, will meet the LOA, ROC or LR objectives. For procurement review board actions,

the results of the traceability review shall be presented to the board.
User participation in the traceability review is encouraged.

Responsibilities of the Developer (MSC/PM)

AMSAA and TECOM

1. Responsibilities of the Developer (MSC/PM):

a. Preparation of the Coordinated Test Program (CTP) in coordination with the Combat Developer, Operational Tester, Logistician, AMSAA and TECOM and with appropriate contractor participation.

b. Management of the Development Test portion of the Coordinated Test Program (CTP).

2. Responsibilities of AMSAA:

a. Preparation of the Independent Evaluation Plan for DT I, DT II, and DT III for major, designated non-major and other selected systems; also to overview the other systems on a sampling basis. This plan details actions for acquiring sound test data responsive to the decision process and provides the basis for formulation of the overall test design. The Plan is coordinated with the Developer (MSC/PM) and TECOM and is provided as input to the Coordinated Test Program (CTP).

b. Preparation of the overall test design for DT I, DT II, and DT III for major, designated non-major systems and other selected systems. The test design serves as the basis for determining those tests that will be performed by the contractor, AMC major subordinate commands, project managers and TECOM which will be used for the overall system evaluation. The test design is coordinated with the Developer and TECOM, and provided as input to the Coordinated Test Program (CTP).

c. Preparation of the Independent Overall Evaluation of major and designated non-major systems and other selected systems for presentation to the Developer and CG AMC.

3. Responsibilities of TECOM:

a. For systems which AMSAA is not the evaluator:

(1) Preparation of the Independent Evaluation Plan for DT I, DT II and DT III. This plan details actions for acquiring sound test data responsive to the decision process and provides the basis for formulation of the overall test design. The plan is developed in coordination with the major subordinate command's "Red Team". The plan is also coordinated with the MSC's materiel proponent and is provided as input to the Coordinated Test Program.

(2) Preparation of the overall test design. The test design serves as a basis for determining those tests that will be performed by the contractor, AMC major subordinate commands, project managers and TECOM, which will be used for the overall evaluation. The test design is coordinated with the MSC's materiel proponent and provided as input to the Coordinated Test Program.

(3) Preparation of the Independent Overall Evaluation in coordination with the MSC "Red Team" for presentation to the Developer and CG AMC.

b. For all systems, TECOM will plan, conduct and prepare analysis of government validation tests, when required. (Advanced Development Verification Test - Government, Prototype Qualification Test - Government, and Production Validation Test - Government). The MSC's materiel proponent and AMSAA will also conduct their own independent analyses of these test results, as required. TECOM will provide test reports and analysis of test results to the MSC's materiel proponent and AMSAA for systems evaluation.

AMSAA PHASE-IN PLAN

SAM-D DT II Test Analysis and Overall Evaluation	Jan 75
TACFIRE DT III Test Design	Jan 75
DSCS DT II Test Design	Jan 75
MICV FPW DT II Test Design	Jan 75
Per. Armor DT II Test Design	Jan 75
TACSATCOM DT II Test Design	Jan 75
AN/TPQ-36 DT I Test Analysis and Overall Evaluation	Feb 75
SAW DT II Test Analysis and Overall Evaluation	Feb 75
UET DT II Test Design	Apr 75
CLGP DT I Test Analysis and Overall Evaluation	May 75
XM198 DT II Test Analysis and Overall Evaluation	May 75
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XM204 DT II Test Analysis and Overall Evaluation	Jul 75
STINGER DT II Test Analysis and Overall Evaluation	Oct 75
XM224 DT II Test Analysis and Overall Evaluation	Oct 75
MICV DT II Test Analysis and Overall Evaluation	Apr 76
8 Inch Proj. DT II Test Analysis and Overall Evaluation	Jul 76
UTTAS DT II Test Analysis and Overall Evaluation	Sep 76

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APPENDIX B

RED TEAM ACTIVITIES

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RED TEAM ACTIVITIES

<u>Conceptual Phase - (8 man-months)</u>	<u>Man-months</u>
1. Review the draft Letter of Agreement (LOA) with regard to the following:	(.5)
a. Confirm or challenge the need for the system/subsystem.	
b. Determine whether the planned development is consistent with the state-of-the-art.	
c. Note whether or not items which require testing are identified.	
2. Generate a draft version of the Independent Evaluation Plan (IEP) for the DT I program.	(4.0)
3. Assist TECOM, in cooperation with the developer, to generate a draft version of the Overall Test Design Plan (OTDP) for DT I.	(3.0)
4. Review the developer's Coordinated Test Plan (CTP).	(.5)
<u>Validation or Advanced Development (AD) Phase - (13.5 man-months)</u>	
1. Review the testing aspects of the AD Request for Proposals (RFP).	(.5)
2. Refine the IEP for DT I.	(.5)
3. Refine the OTDP for DT I.	(.5)
4. Review developer's updated CTP.	(.25)
5. Review the following test plans for DT I:	(1.5)
a. Engineering Design Test (EDT-C/G)	
b. Advanced Development Verification Test (ADVT-C/G)	
6. Conduct Independent Evaluation for DT I, and present results to Materiel Developer and CG, AMC.	(3.0)
7. Generate the Independent Overall Evaluation (IOE) report for DT I.	(2.0)
8. Review TRADOC's draft ROC.	(.25)
9. Generate a draft IEP for DT II.	(1.5)
10. Assist TECOM, in cooperation with the developer, to generate a draft OTDP for DT II.	(1.5)

Engineering Development (ED) Phase - (12.25 man-months)

1. Review the testing aspects of the ED RFP. (.5)
2. Refine the IEP for DT II. (.25)
3. Refine the OTDP for DT II. (.25)
4. Review developer's updated CTP. (.25)
5. Review the following test plans for prototype models: (.5)
 - a. EDT-C/G
 - b. Prototype Qualification Test (PQT-C/G)
6. Conduct independent evaluation for DT II and present results to Materiel Developer and CG, AMC. (5.0)
7. Generate the IOE report for DT II. (2.0)
8. Review the test provisions of the developer's technical data package. (.25)
9. Generate a draft IEP for DT III. (1.5)
10. Assist TECOM, in cooperation with the developer, to generate a draft OTDP for DT III. (1.5)
11. Review proposed amendments to ROC. (.25)

Low Rate Initial Production (LRIP) Phase - (4.25 man-months)

1. Review the testing aspects of the LRIP RFP. (.5)
2. Refine the IEP for DT III, (.25)
3. Refine the OTDP for DT III. (.25)
4. Review developer's updated CTP. (.25)
5. Review Production Validation Test (PVT-C/G) plan. (.25)
6. Analyze the PVT-C/G report. (.25)
7. Perform an Independent Overall Evaluation (IOE) of all DT III tests. (2.5)

APPENDIX C

INDEPENDENT EVALUATION PLAN FORMAT

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DT INDEPENDENT EVALUATION PLAN FOR

(name of phase of development)

(item nomenclature)

1. Introduction. Describes the scope of the plan and approach to be used. The expected source of input data are described, whether test reports, published data, cost/operational effectiveness studies or others.
2. Objectives of the Evaluation. The objectives state the reasons for making the evaluation. The objectives are subject to refinement as the plan takes shape. They should not be stereotyped, but should be thoroughly defensible on the basis of the needs of the program. For example, the objective may be to evaluate a new systems concept for Army use (DT I), to demonstrate that technical risks have been identified and that component interface problems have been pinpointed (DT I), to determine readiness for transition into production (DT II), to determine which of several competing prototypes has the best potential for development (DT I), or simply to determine whether or not a system is ready to proceed in the development cycle.
3. Critical Issues. Critical issues are those identified by the decision authority. The issues will be limited to those appropriate to the specific phase of development (i.e., Conceptual, Validation, Full-Scale Development, or Production and Deployment) and that will be addressed in the evaluation.
4. Other Issues. For example, materiel requirements, choice between competitive candidates, comparison to standard materiel, design/engineering approaches, or contractual/specification aspects. Also included are those issues not required for the evaluation but considered to be essential to other organizations.
5. Alternatives. All the alternatives possible for satisfaction of the function to be performed or requirement to be satisfied are considered. Some can be discarded immediately. Possible alternatives to adopting a new weapon system are: continue with the old system, redesign completely, eliminate the need by avoidance of the particular tactical situation, buy commercial, contract out, and others. Alternatives will further be discussed in paragraph 7d.
6. Evaluation Criteria. The evaluation criteria are not "pass/fail" criteria but guides for use in conducting the independent evaluation and for use in evaluating outcomes to determine which alternative is preferable or what action is indicated to make one of them preferable. The criteria will be keyed to the specific phase of development and, when

appropriate, will reflect performance and reliability growth predictions agreed to by the materiel and combat developers, even if different from those stated in the requirement document (e.g., the LOA for DT I, the ROC, LR or TDR for DT II, or the TDP for DT III).

7. Evaluation Methodology. This section details the analytic methodology that will be used in the evaluation. This must include the use of scoring and weighting factors, mathematical analyses, simulations, or other techniques. Only issues identified in paragraphs 3 and 4 will be included.

a. Models. A mathematical or logical model of the system should be devised, which represents a simplified likeness of the real situation. The model may appear as a decision tree, one or more equations, an iteration of descriptive statements or a combination of these. In any case, the model must permit the inclusion of quantitative values in such a way that some outcome is described or predicated. A sensitivity analysis should be accomplished to show which factors deserve greater emphasis.

b. Threat. A paragraph which states concisely the threat. In particular, the existing and perceived threat that this system is expected to encounter will be explicitly identified. Consideration should be given to factors such as, potential vulnerability to known hostile EW and CBR, enemy forces and tactics. In some cases the total hostile environment must be modeled to permit a thorough evaluation of the system.

c. Analysis Plan. The plan will address each issue stated in paragraphs 3 and 4. For each issue either a single measure of effectiveness (MOE) or a set of MOEs will be defined. MOEs will be the prime quantitative output of the DT and will be the prime determinant of what needs to be measured, why it needs to be measured, and how the data will be analyzed. The analysis plan will be represented by a decision model that integrates all appropriate MOEs into a logical and/or mathematical format to answer the specific objectives of paragraph 2. The evaluation plan must provide for the test designers, a priority listing of variables. Considerations will be given to the most important variables and expected significant interactions. If particular attention is to be given to Human Factors problems that also should be identified and specific MOEs for Human Factors evaluations stated, as appropriate. This paragraph summarizes the detailed analysis information contained in annexes. For simple, low-cost items not requiring extensive evaluation, the annexes may be omitted and the complete analysis plan presented in this paragraph.

d. Analysis of Alternatives. Procedures for analysis of each alternative identified in paragraph 5, Alternatives, will be presented.

8. Constraints. This section should detail limitations in the evaluation due to time, fiscal, or other constraints. Compromises which must be made and those which cannot be tolerated should be stated.

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